

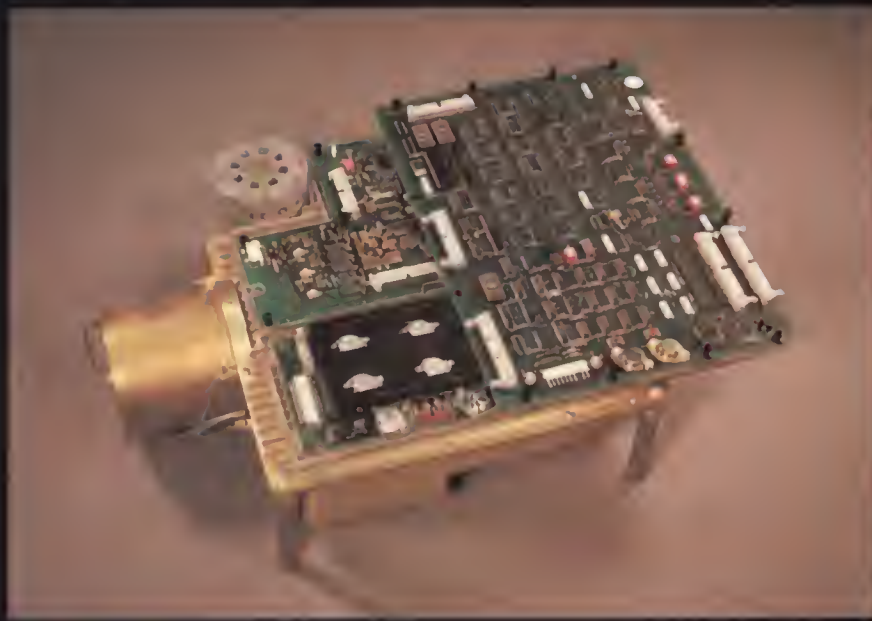
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# AMS

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## ADVANCED MARKSMAN SERIES OF FIXED DISK DRIVES

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### FEATURES

Storage capacity 190/380 MB Advanced Winchester Technology

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### MECHANICAL DESIGN:

Rugged heavy duty construction design for applications demanding high reliability and low maintenance. Service life exceeding 7 years.

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### THERMAL DESIGN:

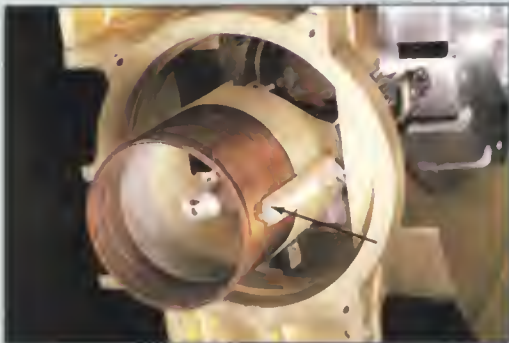
Maintains the data integrity specification of 1 in  $10^{10}$  data error rate across an extremely wide temperature range.

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### ELECTRONIC DESIGN:

Based on known proven technology and components.

The combination of the design features of the Century Data Systems AMS disk drive provide the user with the highest level of data and operating reliability on the market today.



## **LINEAR POSITIONER.**

High performance drives offer fast access times. One of the major contributors to access time is the track to track positioning time. Two similar positioning technologies can meet the required track to track time of the AMS class of drives: the straight linear motor; the rotary linear motor.

Century Data Systems AMS drives feature a heavy duty straight actuator. The motor construction is similar in simplicity to a speaker voice coil and magnet. The design has been optimized to reduce resonances, minimize input power requirements, and rapidly dissipate heat. The AMS positioning system delivers crisp speed and superb accuracy with minimum power consumption. The motor is internally cooled to allow the positioner to operate at full performance over a wide temperature range without danger of thermal runaway. For extra protection, an internally mounted thermistor feeds back to the servo control electronics.

The linear motor offers the user a zero maintenance head positioning system with the absolute best performance available on the market.

## **HEAD POSITIONING MECHANISM.**

Reliable data integrity is cornerstoned on stable positioning of the read/write head in pitch, roll, and yaw as it flies over the disk surface. Fluctuations in flying attitude tend to cause variable amplitude data recording and read back signals, causing errors such as data drop out during settling time.

Century Data Systems drives incorporate a proven, reliable, high precision, tri-rail positioning and stabilizing system consisting of polished, hardened stainless steel rails and a six point precision ball bearing suspension method for all axis attitude control.

This positioning technique assures the AMS user the highest level of data integrity available from a rotating memory product in this performance range.

## **HEAD ELECTRONICS BUFFER AMPLIFIER.**

False data signals generated by noise and cross talk can be a major problem in high performance disk drives.

Buffer electronic amplifiers are located on the head arm assembly of the AMS drive to maximize the signal to noise ratio.

The use of low impedance circuits in all critical noise sensitive circuits assures the AMS user of a high level of data confidence.

## **HEAVY RIBBED CASE.**

High performance disk drives achieve their short track to track access times by rapidly moving the head positioner mechanism radially across the disk. Because the inertia loads are high, rigid mechanical structures are required to prevent shock and reduce resonant motions between critical mechanical components.

Century Data Systems AMS drives are designed of heavy duty aluminum alloy with rigid reinforcing ribs. The reinforcing structure, in addition to dampening vibration, supplies additional thermal radiating surfaces at the bearing housing structure.

The AMS vibration dampening case offers the highest performance track to track access times, mechanical reliability, combined with quiet, low vibration operation.



## LANDING ZONES AND ELECTRO-MECHANICAL BRAKES.

During start up and power down cycles the disk is not spinning at full speed. The Winchester head is in unstable flight and most susceptible to crashing, chipping and bouncing onto the disk. These unstable flight problems may not cause permanent damage to the head itself, but produce a risk of injuring or wearing the media surface and degrading data integrity.

Century Data Systems drives incorporate an excellent feature—dedicated head landing zones. The inside and center cylinders are utilized only for take-offs and landings. No data is ever recorded on these cylinders.

To the user, dedicated landing zones mean that there is no chance of accidental data degradation due to head disk contact on the data recording areas.

Century Data Systems AMS drives utilize a positive, electrically controlled mechanical brake to rapidly decelerate the disks to minimize hazardous unstable flight time. The Century Data Systems electromechanical brake is proven in thousands of drives.

The use of electromechanical brakes significantly reduces unstable flight time during power down. The user is assured of the highest confidence of long reliable head/media life and solid data integrity.

Additionally, the brake provides positive locking of the rotating components during shipping without requiring additional mechanical hardware or instructions (which often get lost, or are unused at the user's facility).

## AC SPINDLE MOTOR.

Disk drives require long life, reliable, drive motors able to operate on worldwide power.

Century Data Systems AMS disk drives feature an AC motor designed to operate at any of the standard voltages and frequencies. The AC motor is permanently lubricated and has no required maintenance.

The AC motor provides drive rotation without loading the system DC power supply. This is a significant cost reduction feature to the system builder, because it minimizes the expensive DC power supply. Additionally, no motor speed control electronics are required. Minimum parts requirement equals higher MTBF.

## HEADS.

The ultimate determiner of data integrity is the read/write head—material and geometric design of the head determine track width and data density.

AMS drives incorporate two different head designs dictated by the track and data density required for 190/380MB storage capacities. The ferrite monolithic head is used on the 190MB model and a calcium titanate ferrite composite head is used on the 380MB model.

Each head design easily provides data integrities in excess of design specifications while offering the OEM confidence in a field-proven technology.





## **ABSOLUTE FILTRATION SYSTEM.**

Particle matter inside the sealed bowl can be disastrous causing head/disk contact thereby destroying valuable data or causing the drive to become inoperable.

Two absolute filters are used in the Century Data AMS drives. One filter located within the sealed unit cleans the recycled closed loop air system. The primary function of this filter is to pick up any particles which may become airborne from the drive mechanisms. The other filter located on the drive over the pressure equalization port in the ribbed cover insures that any air entering the recording environment is free of damaging particle matter.

The double filtration system ensures total protection of the recording environment from particle contamination and the longest achievable drive life.

## **HEAD MECHANISM SERVO POSITIONING— DATA INTEGRITY.**

Every disk drive design attempts to produce a cost efficient "perfect" product. Typical design considerations include: head positioning accuracy and hysteresis; spindle concentricity; thermal expansion; mechanical wear and external environment, such as temperature, shock, and vibration.

Tolerance build ups and external effects can cause off track data errors. To compensate for these positioning errors, a servo feedback system is employed.

Century Data AMS drives use a high performance closed loop servo system to achieve specified performance over wide variations in internal mechanisms and external environment. Servo positioning data is written and monitored by a dedicated servo head. A unique feature of the AMS servo correction system is its extreme high accuracy.

The servo correction information is written in the drive with its own head and positioning system. The special machine that does the writing incorporates laser position measuring equipment to place the servo track so precisely that variations in performance due to electro-mechanical/external changes are reduced to the absolute minimum achievable.

The closed loop positioning servo system is insurance to the user, that the AMS drive will continue to operate at its design specifications throughout its life expectancy.

## **2400 RPM ROTATION SPEED.**

The 2400 RPM rotation speed used in the AMS disk drives gives the system designer an easy method of upgrading lower capacity 80/160MB Marksman systems to higher storage capacity AMS drives with minimal system redesign costs. Transfer rates are consistent with current controller technology.

## **MAINTENANCE.**

Maintainability is a key concern of all disk drive users.

The Century Data Systems AMS is designed for minimum maintenance. No mechanical service is required. All drive electronics are located on the top of the head disk assembly in three PCB's comprised of an interface board, servo board and read/write board.

Boards are retained on the card carrier with snap fasteners. No special tools are required for removal or replacement. Trouble shooting is fast and straight forward.

The MTTR of the AMS is minimal. The end user will be pleased with the MTTR and the OEM will enjoy a good reputation for quick service.

Maintenance test controller is available for manufacturing/field trouble shooting and diagnostics.



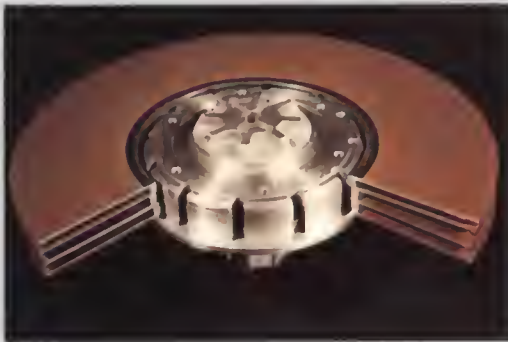




## THERMAL DESIGN CONSIDERATIONS OF THE ADVANCED MARKSMAN SERIES DRIVE.

The diagram above shows the heat flow into, around, and out of a typical Winchester. Of major concern is the temperature differential between the disks and head positioning arms. Temperature differentials cause dimensional variations between mechanical components which result in off track errors.

The Century Data Systems AMS drive design is heavily concentrated on the reduction of off track errors. Forced air circulation is featured as the primary temperature balancing mechanism. Additional designs unique to Century Data Systems drives are shown on this page.



## VENTILATED SPINDLE.

The Century Data Systems AMS drive features a filtered forced air temperature balancing design unique in the industry—the ventilated spindle.

The Marksman is the only family of drives on the market offering pressurized air interdisk temperature balancing. The diagram illustrates the significant temperature balancing improvement afforded by the ventilated spindle.

Century Data Systems AMS drives offer the best design, specifically optimized to deliver the ultimate in data reliability.



## RIBBED TOP COVER PLATE.

A ribbed cast aluminum top cover plate provides AMS drives an additional heat dissipation capacity. When bolted to the heavy duty bowl structure, the ribbed top cover plate completes the solid, vibration dampening structure housing the drive.

The electronics card carrier is mounted above the aluminum cover plate. It acts as a baffle to channel cooling air past the ribs for the most effective convective efficiency.



## LINEAR MOTOR.

The linear motor is mounted outside of the bowl assembly to prevent any unnecessary heat from being injected into the disk chamber.

Externally mounting the positioner motor is another design feature targeted to produce long life, reliable drives.



## ACCESS TIME.

Much confusion and specmanship exists in the Winchester world today. One of the least understood important specifications describing a Winchester drive is Data Retrieval Time.

Data Retrieval Time = Average latency time +  
Average positioning time

Average latency time is defined as 1/2 the time required for one revolution of the disk.

Average time for head positioner motion is defined as all possible combination of seeks, divided by the number of seek combinations possible.

For the high performance AMS drive:

$$\text{Data Retrieval Time} = \begin{array}{|c|} \hline 12.5\text{ms} \\ \hline \text{Avg Lat Time} \\ \hline \end{array} + \begin{array}{|c|} \hline 25\text{ms} \\ \hline \text{Avg Pos Time} \\ \hline \end{array} = \underline{\underline{37.5\text{ms}}}$$

@ 2400 RPM

Typical High Performance Drive:

$$\text{Data Retrieval Time} = \begin{array}{|c|} \hline 8.3\text{ms} \\ \hline \text{Avg Lat Time} \\ \hline \end{array} + \begin{array}{|c|} \hline 30\text{ms} \\ \hline \text{Avg Pos Time} \\ \hline \end{array} = \underline{\underline{38.3\text{ms}}}$$

@ 3600 RPM

## AVAILABLE OPTIONS.

- Power supply
- Enclosure including cooling fans and AC distribution assembly
- Rack mount slides
- Custom colors
- Trident interface
- SMD interface

## SPECIFICATIONS:

	190	380
Unformatted Capacity	191 MB	378.5 MB
Cylinders per drive including spares	569	845
Bytes per track	24K	32K
Tracks per cylinder	14	14
Recording density (BPI)	7.54K	10K
Track density (TPI)	480	712
Data surfaces	7	7
Disks per drive	4	4
Servo surfaces	1	1
Data heads per surface	2	2
Performance:		
Data transfer rate (KBS)	960	1.28K
Spindle speed (RPM)	2400	2400
Bit density (BPI)	7.54K	10K
Access time (MS)		
Maximum	50	50
Average	25	25
Minimum (one Track)	6	6
Average Latency Time (MS)	12.5	12.5
Size with enclosure and power supply	9.75" H x 17.75" W x 30" D	

### Reliability and Service

MTBF	8000 hours
MTTR	< 1 hour
Data Error Rate	
Recoverable	Not more than one error in 10 <sup>10</sup> bits read
Non-Recoverable	Not more than one error in 10 <sup>13</sup> bits read
Positioning errors:	< 1 in 10 <sup>6</sup> seeks
Maintenance:	No scheduled maintenance

Specifications are subject to change without notice.

### Sales Offices

Anaheim, CA (714) 632-7500  
 Cranford, N.J. (201) 272-1730  
 Dallas, TX (214) 699-1682  
 Santa Clara, CA (408) 727-2833  
 Schaumburg, IL (312) 397-1007  
 Vero Beach, FL (305) 231-5700  
 Waltham, MA (617) 890-1670

### International Locations

Homburg, Germany 49-6172-26043  
 Surrey, England 44-4862-71991



**Century Data Systems**  
 A Xerox Company

**Century Data Systems**  
 1270 N. Kraemer Blvd.  
 Anaheim, CA 92806

**North American Headquarters**  
 (714) 632-7500